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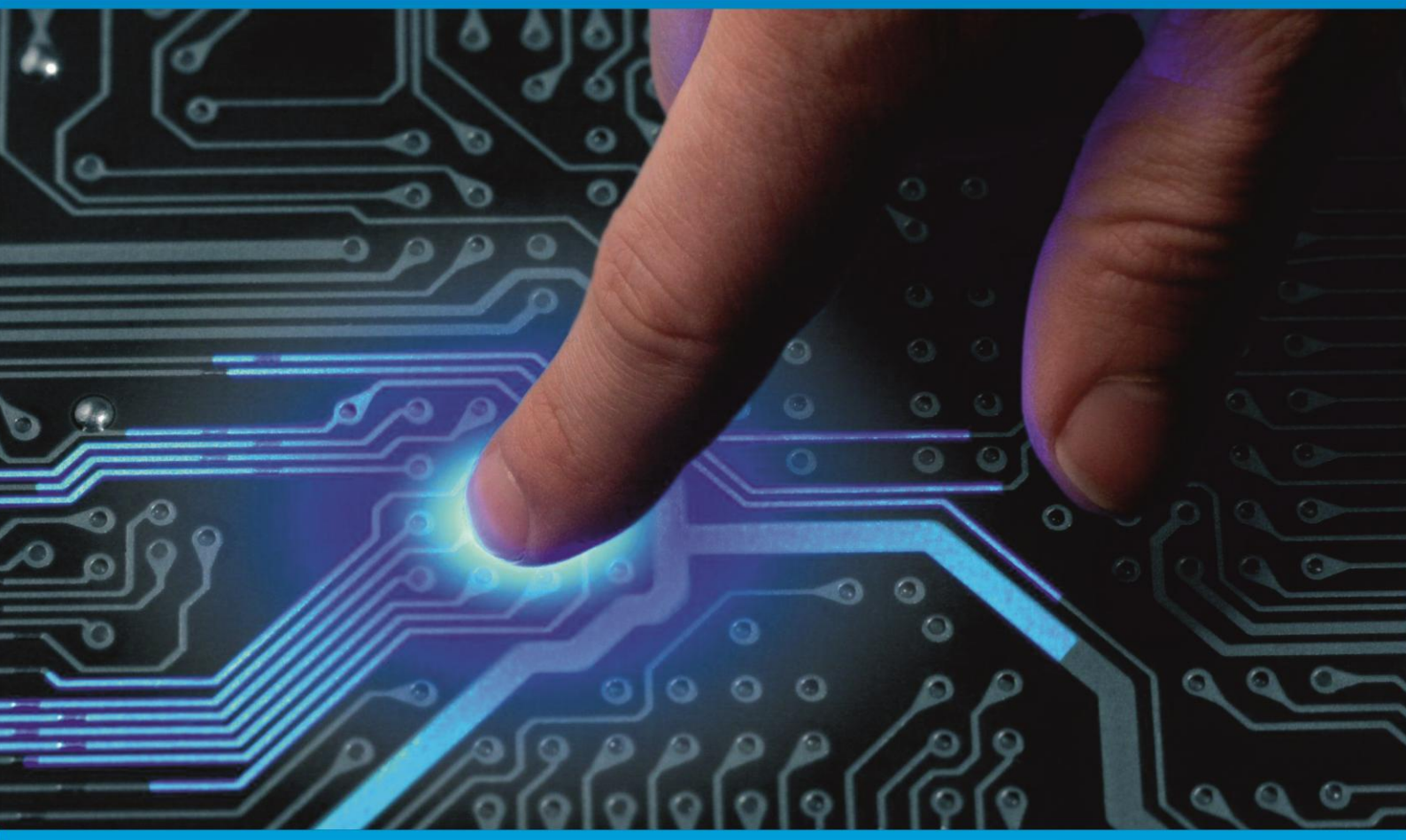

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# Women Safety Night Patrolling IOT Robot

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**ABSTRACT:** The robot is playing important role in daily life. It can be used for security purpose, to reduce the time of work and increases the work efficiency. The security of road area, home, office and building is important aspect of human life. The paper gives an idea of improving the patrolling ability of police in a local area. This system contains a night vision camera mounted on the robot which can capture the images, record it and then it will send it to the control station. With this system it has the ability to transmit real time video and audio signal to the control station. This type of project can be used in the night time as well as in day time. It consists of a camera which will record a high quality video and send it to control station. The system will mainly be used to detect different activities in the outside area and report it to the control station. Many of the police departments now are using the different types of robots for performing different dangerous activities.

**KEYWORDS:** women safety, IoT, Raspberry Pi, ultrasonic sensor, patrolling

## I. INTRODUCTION

Women safety is the biggest threat to India. There are many areas in which women are not feeling safe. This should be changed as much soon as possible. Technology changes and improves day by day to change the way human are living. So this paper focuses on updating technology framework to make stronger women safety mechanism.

The word **robot** comes from the Czech word for forced labor, or serf. It was introduced by playwright Karel Capek, whose fictional robotic inventions were created by chemical and biological, rather than mechanical, methods. Basically a robot consists of: a mechanical structure, such as a wheeled platform, arm, or other construction, capable of interacting with its environment, Sensors to sense the environment and give useful feedback to the device and Systems to process sensory input in the context of the current situation and instruct the device to perform actions in response to the situation.

The robot structure consists basically of the robot body that includes arms and wheels. Some force such as electricity is required to make the arms and wheels turn under command. One of the most interesting aspects of robot in general is its behavior, which requires a form of intelligence. A variety of electric motors provide power to robots, making them move with various programmed motions. The efficiency rating of a motor describes how much of the electricity consumed is converted to mechanical energy.

A digital logic circuit controls the mechanical system. The circuit is usually coupled to the mechanical structure through a bridge relay. A control signal generates a magnetic field in the relay's coil that mechanically closes a switch. Transistors, for example, are good silicon switches, available in many technologies to control the mechanical systems.

Microcontrollers are intelligent electronic devices that are used inside robots. They deliver functions similar to those performed by a microprocessor (CPU) inside a personal computer. Microcontrollers are slower and have less memory than CPUs, but are designed for real-world control problems. One of the major differences between CPUs and microcontrollers is the number of external components needed to operate them. Microcontrollers may run with no external parts, and typically need only an external crystal or oscillator. There are three main characteristics of a microcontroller for consideration: speed, size, and memory. **Speed** is designated in clock cycles, and is usually

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measured in millions of cycles per second (Megahertz, MHz). **Size** specifies the number of bits of information the Microcontroller can process in one step (for example, 4-, 8-, 16-, and 32-bits).

Women are accomplished at mobilizing diverse groups for frequent causes. They often work across racial, sacred, opinionated, and intellectual divides to encourage tranquillity. We are aware of importance of women's security, but we must recognize that they should be well secured. A Woman is not much powerful when compared to men physically, in a crisis situation and needs a helping hand to relieve them. The best way to minimize chances in becoming a victim of violent crime (robbery, sexual assault, rape, domestic violence) is to identify and call on resources to help you out of unsafe situations. Whether you are in instant trouble or got separated from friends during night and do not know how to get home, having these apps on your phone can diminish your risk and bring assistance when you require it.

## II. LITERATURE SURVEY

The existing systems available and surveyed can be categorized into three ways as follows:

**1) Systems designed as a mobile app for the android mobile**

The paper [1] proposes a voice keyword recognizing app to recognize the user and activate the app functionality even when the mobile keypad locked. The GPS module tracks the longitude and latitude to trace an exact location of a user and sends the pre-stored emergency message including location to the registered contact numbers. The Audio Recording module starts the recording of the conversation for five minutes and stored as evidences. The message goes in queue if network problem and send when network gets available. A notification is generated for successful deliver message. Also user can select contact through voice based contact list and make a call. Note: The spoken keyword converted into a text to compare with the registered keyword.

The paper [2] proposes an emergency response situation recognizing app called as IPROB to provide women safety even in the situation like terrorist attacks or natural disaster, by just shaking the mobile above the predefined threshold value automatically activate the system. It starts capturing the surrounding voice to test and confirm the unsafe IPROB situation where it raised the notification and user fail to respond in predefine time then the message alert sends to the register contacts. If the mobile profile at the receiver is in silent mode then convert it into the General profile to give the voice notification as “YOUR CHILD IS IN TROUBLE PLZ HELP...PLZ HELP …” continuously like a ring tone, until they stop it. If a register contact confirms a PROB then appropriate emergency services like ambulance, fire brigade are alerted. If a register contact responds with an audible notification, then it automatically connects and enables the speakerphone at the victim side. An integrated tri-axial accelerometer used to evaluate the unique movements that a phone experiences as threshold.

The paper [3] proposes a SCIWARS app (Spy Camera Identification and Women Attack Rescue System) which consist of two modules. A first module act as an intelligent alerts system which detects the infrared rays coming from every Night-vision hidden cameras placed in changing rooms- hotels room etc and also informed the user about unsafe place through message. Now it’s the user responsibility whether to register a complaint or not by forwarding the notification with the location to legal authorities such as Police. The second module will get activated by pressing any key continuously which will provide the help to the victim from physic attack in unsafe situation. It sends the emergency message containing location to register contacts. It also records the voice and captures the images of the surrounding for 45 seconds. This information also stored in secret location of mobile for future evidences. This app also able to converts the receiver mobile profile from silent to general mode, and also supports the auto-call receiving system at victim side.

The paper [4] proposes an android app to provide security at two different situations as follows. The First module provide security to Women at Emergency Situations propose a Save Our Souls (SOS) app to provides the security on a single click of SOS button for the women travelling at night or alone. No need to unlock the screen, instead by just pressing the power button it directly triggers the application to run at the background, to send the emergency message including the location in the form of latitude and longitude to the registered contacts. The second module proposes an android based home security system that provides security of house belongings and Senior Citizen in the user absence. Since the security of senior citizen is always a concern with increasing number of robbery

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incidents. This app informs the user about an attempt of intrusion activity at home through a message and a feedback SMS triggers an alarm in the house. The minimum requirement is the android mobile, a hardware circuit embedded with a switch and GSM modem that are connected to the door. When an intruder tries to open the door, the switch triggers an interrupt for the microcontroller to activate the GSM modem to send warning SMS to the store registered number in the modem. At the receivers end the application pop up the menu frequently for user attention. If the user fails to acknowledge in the defined time interval, then the automatic positive acknowledgement message get send to the remote GSM modem which in turn interrupt the microcontroller for an alarm.

The paper [5] proposes an app, in which a single click of SOS sends a message containing the location and/ or audio- video call to the guardian number. At receiver touch the location URL in the message to view it in the Google Map. It also provides different help tools like First-Aid help, Fake Call Help and video call. The First-Aid help tool provides the help on various health issue problems occurred at an accidental or emergency situation during the night time. First aid help for various problems are as: unconscious and not breathing, choking, bleeding heavily, burns, heart attack, diabetes etc. The Fake call help to escape from the meetings- parties at a time when women start feeling uncomfortable and think that, "if someone calls me then I can leave this place". Fake call rings tone same as that of normal incoming call ring and once call accepted it stop ringing. It also supports Fake Hang Up option. The guardian contacts are by-default for this app, but it able to search the cops, firemen, hospitals contacts nearby to your location. It also sends the audio-video recording via Email-Gmail of emergency situation taken by the user where user unable to speak or tell the circumstances.

**2) Systems designed as a device with the help of Microcontroller:**

The IEEE real project [6] propose an automated highly reliable women security device which consist of the advanced sensors embedded in a wearable dresses. It consist of advanced sensors, GSM and ATMEGA8 microcontroller with ARDUINO tool which keep user under observation at all the time. It monitors the heart beat-rate, temperature and vibration in body through sensors to check for uneasy situation. In such situation it will activate the GPS module to track the location and wireless camera to capture the images that get send to the control room of the receiver through GSM modules to take necessary actions. At the same time processor activate the mice unit with amplifier which strengthens the voice of the women to screams or shout above the threshold limit.

The Paper [7] proposed a portable device as a belt which is automatically activated base on the pressure difference crosses over the threshold in unsafe situation. A GPS module track the location and sends the emergency messages to three emergency contacts every two minutes with updated location through GSM. The system also activates the screaming alarm that uses a siren, to call out for help and also generates an electric shock to harm the attacker for self-defense which may help the victim to escape. The device mainly consists of micro controller on the ATMega328 board which programmed using the ARDUINO programming language.

The paper [8] proposes the women security device called as "Suraksha" which is an easy to operate device. This device can be activated through- voice command, Press a switch key and shock (i.e. when the device is thrown with force, a force sensor used to activate the device). In emergency situation it will send the message including instant location to the police, via the transmitter module and registered numbers via a GSM module. Currently the work is under process to embed it in jewelries, mobile or other carrier like belt etc. It can play a major role in the propose projects where all the police stations are connected and share the criminal records, crime investigating cases etc.

The paper [9] proposes an extended vehicle tracking system to track the vehicle based on GPS with that it also provides the safety through an emergency button kept under the vehicle seat using GSM. As the increasing economic growth rate of a country, many companies are establishing their setup in the nearby region of the cities. Since, the security of women employees' inside the private transportation is the companies' responsibility. In the unsafe situation an employee need to press the emergency button to activate the device Teltonika-FM1100. It in turn enables simultaneously the android device used to capture the images inside the vehicle and the GPS system which track the vehicle position in the form of latitude and longitude. An alert message including the location is send card to the company special team and nearby police station through GSM SIM. After that it is the responsibility of police squad and company team to handle the situation. The security in the system can be further enhances by using Geo-Fencing software that uses the GPS and Google Earth to define the Area-Zone for a vehicle that act as a virtual barrier. An admin uses the tools provided by the software to set geographical boundaries which help to detect wherever a vehicle enters or leaves the customized geo-fenced area and restrict the drivers to travel from the

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sensitive zones. The admin can see the reports of vehicle position, speed, ignition status and travelling report and also instruct the driver on the speaker phone that is placed inside the vehicle. [Note: The Teltonika-FM1100 device has a GSM SIM slot where one GSM SIM inserted to send and receive the messages. Another GSM SIM card is placed inside the android device of vehicle to exchange the images through messages or through email alert. The ignition system with GPS provides the status of the car as start or stop, it also track the location of vehicle after fix time interval to be viewed the position on Google map.

**3) An advanced artificial intelligence security systems:**

The paper [10] proposes the advanced automatic technique to predict the unsafe situation based on the female emotion as fear, anger etc. The system follows the steps given below to determine the chaotic situation under the surveillance region to identify the violence situation.

1. At a higher altitude camera2 placed to obtain the body movements as well as to provide the surveillance. If the population density calculated for a given frame contain more than fifteen individuals then such situations are not consider for further processing since the chances of attack in the crowded place are less. The Chaos analysed by comparing two successive equal sizes captured images through camera1 is place in such a way that it will captures the face emotion. For two persons, the camera field of view is divided into two regions to find out the distance between the individuals which get compare with pre-defined value called as threshold. If the variance is small indicating the safe distance whereas the large variance indicate the unsafe situation to activate the gender detection section.
2. It checks the gender as male or female base on the facial features (correlation value) to identify at least one female to activate the system.
3. Facial Expression Reorganization System used to recognize the individual action base on the facial expressions by performing the following steps:
    a. Acquisition step: - It detects and captures the face (normally head position).
    b. Extraction step: - To extract the features from image after pre-processing.
    c. Gesture recognition step: - It provide intelligent ways to classifies feature into emotion reorganization feature to generate the fine face details as smile, fear and anger.
    d. GSM module and alarm system: - If emotion on female face is detected as fear/ anger, and notification generated and send to the control room. Also, it activates the surrounding siren. The system able to capture and store the face expression of suspect as for the evidences.

Since the system predicts about an unsafe situation hence require advance technology. Various protection systems are proposed and designed by ample researchers that are broadly classified into three categories namely, systems designed as mobile app for android mobile, systems designed as a device using micro-controller and advanced artificial intelligent security systems. We are proposing a smart jacket, a different system from above existing systems that is designed using Raspberry Pi

## III. PROPOSED ARCHITECTURE

Nowadays Women Safety is the biggest concern in many parts of the world. There is still a fear in alone areas for women as well as men. So here we propose a security patrolling robot using Raspberry PI.

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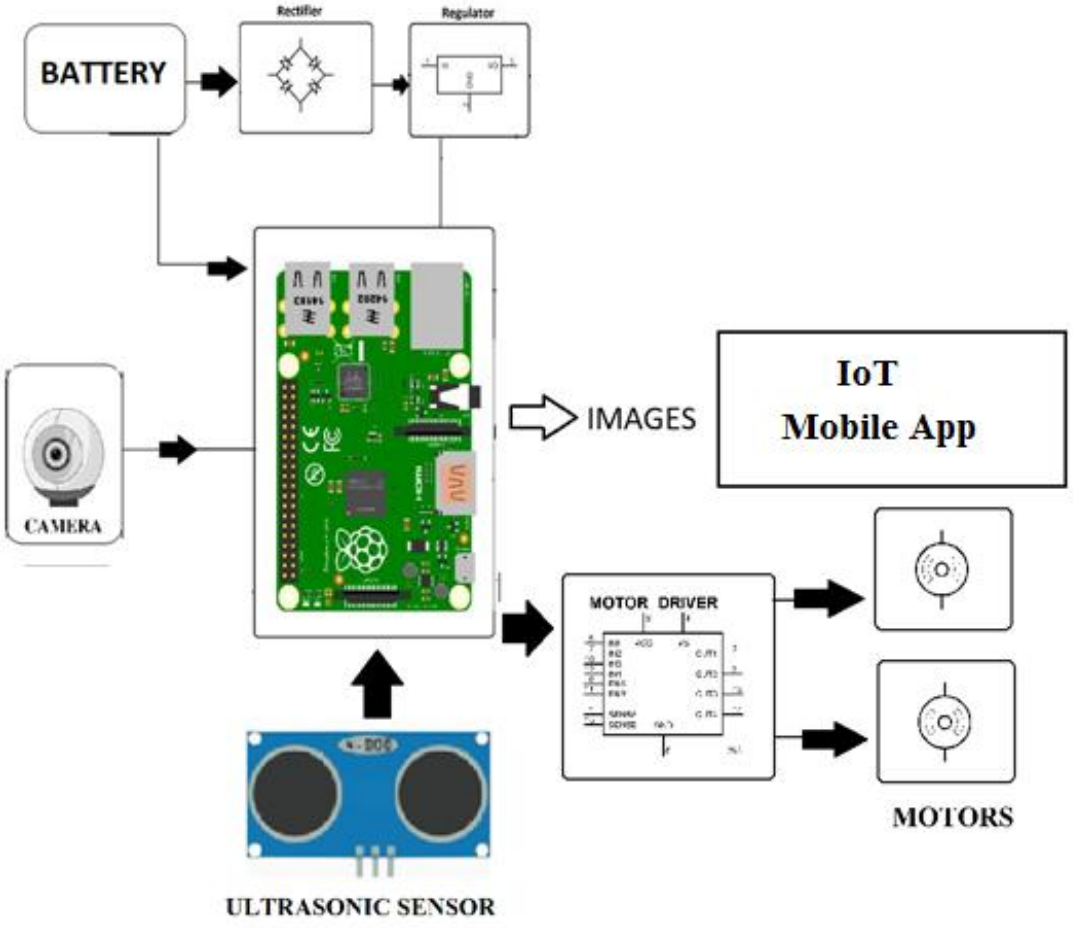


Fig 1 block diagram of proposed system

The system uses cameras and mics mounted on robotic vehicle for securing any premises. The robotic vehicle moves at particular path and is equipped with camera and sound sensors. It uses a predefined line to follow its path while patrolling. It stops at particular points and moves to next points if sound are detected. The system uses IR based path following system for patrolling assigned area. It monitors each area to detect any problem using camera. It has the ability to monitor sound in the premises. Robot hears Any abnormal activity after area is quite and it starts moving towards the sound on its predefined path. It then scans the area using its camera to detect any human faces detected. It captures and starts transmitting the images of the situation immediately to the IOT mobile app. Here we use IOT fairebase for receiving transmitted images and displaying them to user with alert sounds. Thus we put forward a fully autonomous security robot that operates tirelessly and patrols large areas on its own to secure the facility.

## IV. CONCLUSION

According to this system, whole area surveillance is done using the night vision camera and also automatic system when the abnormal activity is detected robot will follow the particular path and go to that area and capture the area and send using IOT. This system is an automatic smart way for night vision patrolling.

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